Composites for Exploration Upper Stage (CEUS)

Completed Technology Project (2014 - 2016)

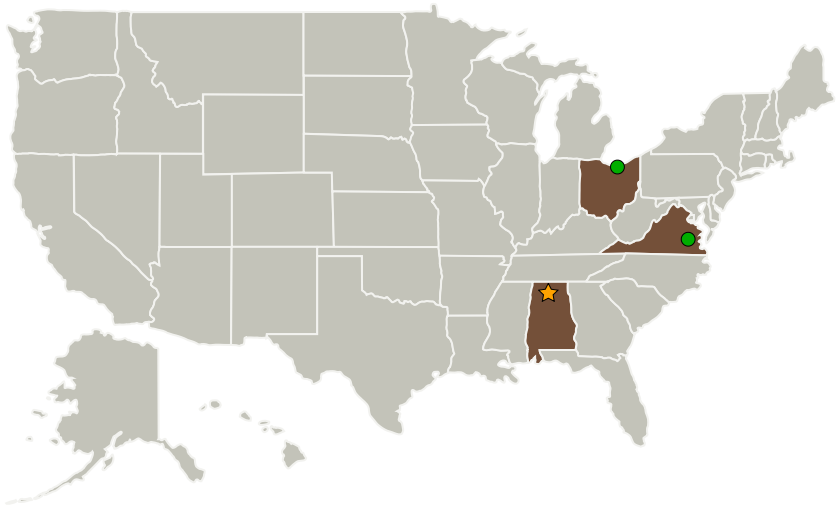
Project Introduction

NASA's Space Launch System (SLS) will provide the capability to travel to deep space. The current state-of-the-art material for structures of this scale is an aluminum alloy that poses significant challenges to further reduce weight while maintaining requisite safety margins. Existing human space flight vehicles do not utilize composites for primary structures since critical technologies have not been validated at scale in a relevant environment. The purpose of this project is to design, build, and test composite structures on the same scale needed to validate manufacturability, structural margins, and thermal isolation improvements. The objective is to provide designers a validated alternative structural material candidate in future trade studies for SLS as well as other large booster and space science platform structures. The project is a cooperative effort between the STMD and HEOMD, involving multiple NASA Centers. The project will also leverage collaborations with DoD, industry and academia to provide the most innovative and affordable ideas.

Anticipated Benefits

The objective is to provide designers a validated alternative structural material candidate in future trade studies for SLS as well as other large booster and space science platform structures. Composite structures provide potential cost savings, weight savings and thermal advantages with increased reliability compared to metallic structures.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Marshall Space Flight Center(MSFC)	Lead Organization	NASA Center	Huntsville, Alabama
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Co-Funding Partners	Type	Location
Space Technology Mission Directorate(STMD)	NASA Mission Directorate	

Primary U.S. Work Locations	
Alabama	Ohio
Virginia	

Project Transitions

September 2014: Project Start

September 2016: Closed out

Closeout Summary: Accomplished (1) manufacturing tool procurement, materi als procurements, composite materials equivalency testing and (2) completed tr ade study to refocus project effort to the SLS Universal Stage Adapter (USA)

Project Website:

https://www.nasa.gov/directorates/spacetech/home/index.html

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Marshall Space Flight Center (MSFC)

Responsible Program:

Technology Demonstration Missions

Project Management

Program Director:

Trudy F Kortes

Program Manager:

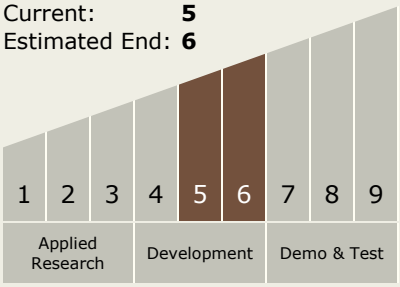
Tawnya P Laughinghouse

Principal Investigator:

John H Vickers

Technology Maturity (TRL)

Start: **5**
Current: **5**
Estimated End: **6**



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Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - TX12.4 Manufacturing
    - TX12.4.1 Manufacturing Processes

Target Destinations

The Moon, Mars, Others Inside the Solar System